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The Bureau of Reclamation's Aging Infrastructure

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Summary

The Bureau of Reclamation (Reclamation) is responsible for the construction of most of the large irrigation and water resources infrastructure in the West. These water resource facilities are dispersed throughout 17 western states and have an original development cost of more than $21 billion. Most of Reclamation's infrastructure has an average age of over 50 years. This aging infrastructure requires increased maintenance and replacement efforts and expenditures. Reclamation estimates that the total cost for upgrades at all of its facilities exceeds $3 billion.

Reclamation has a documented plan to assess the management needs of its portfolio of aging infrastructure. However, deferred maintenance needs are increasing, and water resource infrastructure management objectives require prioritization due in part to a finite budget. Reclamation's work on deferred maintenance and replacement is complicated by the fact that it maintains only one-third of the infrastructure that it owns. The remaining two-thirds are owned by Reclamation but have been transferred to local entities ("transferred works"). This makes for a unique combination of deteriorating infrastructure, patchwork management responsibilities, and limited financing that inevitably leads to conflicts over project priorities. As Reclamation's portfolio of infrastructure continues to age, these conflicts are likely to arise more often.

Some have argued for changes to the existing processes that address Reclamation's aging infrastructure. To date, funds have been authorized and appropriated for a national program that focuses on a certain class of resources (dams). However, outside of this program, no national list of maintenance and upgrade priorities exists, and there are no major programmatic authorities for Reclamation to address these needs without repayment by users (which can make upgrades prohibitive in some cases). Recently, Congress has authorized a loan program to address aging infrastructure and has provided the Secretary of the Interior with the authority to advance federal funds and extend repayment periods for extraordinary maintenance projects. However, as a matter of policy, the Administration has generally refused to request funding for efforts that would primarily benefit nonfederal users. In the future, users are likely to continue to argue for more funding (particularly for transferred works), as well as for reforms to the overall process of documenting and selecting projects for improvements.

At issue for Congress is whether to require additional analysis on the status of Reclamation's infrastructure needs. Additionally, Congress may consider whether Reclamation's existing planning and funding mechanisms for aging infrastructure are adequate, or whether new or enhanced mechanisms for these maintenance needs are required.

This report describes Reclamation's approach to managing aging infrastructure as well as that of two other agencies—the Army Corps of Engineers and the Natural Resources Conservation Service—involved with significant portfolios of dams and related infrastructure. It includes discussion of several alternative approaches to managing Reclamation's aging infrastructure that have been enacted or proposed, and thus may be the subject of debate.

Contents

Figures

Contacts

Introduction

Most large dams and water diversion structures in the West were built by, or with the assistance of, the Bureau of Reclamation (Reclamation) within the Department of Interior. Reclamation's mission is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.[1] In most cases, this means developing water supplies primarily for irrigation to reclaim arid lands in the West.

Reclamation has constructed a significant number of assets since it was founded in 1902. It has over three-fourths of the Department of the Interior's (DOI's) constructed assets, making the agency a manager of significant infrastructure and supporting assets. Reclamation manages water resource facilities in 17 western states with an original development cost of approximately $21.2 billion.[2] Citing engineering indices, the agency has estimated that the replacement value of all Reclamation infrastructure would be over $78 billion.[3] Reclamation's inventory of assets includes 480 dams and dikes that create 348 reservoirs with a total storage capacity of 245 million acre-feet of water.[4] Through its assets, Reclamation serves more than 31 million people, and provides irrigation water for 10 million acres of farmland that produce 60% of the nation's vegetables and 25% of its fruits and nuts. Reclamation is also the nation's seventh-largest producer of hydroelectric power, with 58 hydroelectric power plants that provide an average of more than 44 billion kilowatt-hours of energy each year.

Reclamation is over 100 years old, and most of its facilities are more than 50 years old. (The average age of Reclamation's dams is provided in **Figure 1**). As with other structures, as these facilities reach their design lifetime, maintenance requirements tend to increase, and in some cases, the likelihood of failure also increases. Few large new projects are currently being built by Reclamation, and the bureau has in recent years increased its emphasis on responsibilities to operate, maintain, and repair its existing facilities. Assuming limited budgetary resources as this infrastructure continues to age, maintenance needs are likely to increase, as is competition for limited funding.

An additional problem faced by Reclamation is the ability of project beneficiaries and/or sponsors to finance some major repairs and upgrades. While issues at facilities with the capacity for immediate repayment (such as power facilities) may receive prompt attention, issues that arise at other facilities, such as water supply and delivery facilities where there is limited ability to pay for large repair costs, may not always be acted upon.

[1] See http://www.usbr.gov/main/about/mission.html.

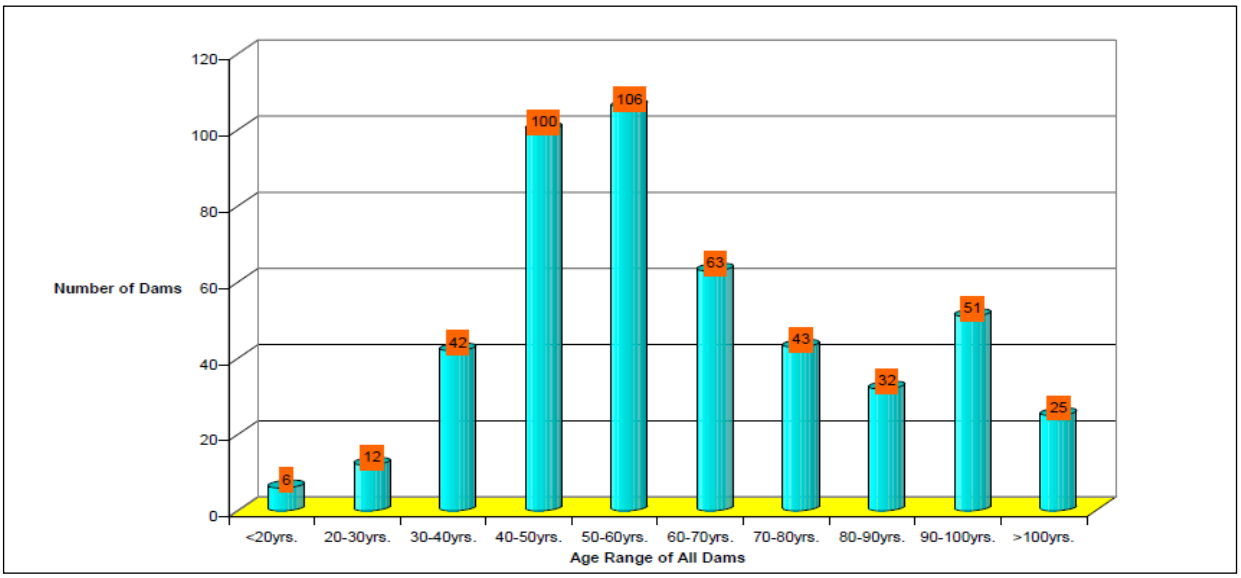
[2] U.S. Dept. of the Interior, Bureau of Reclamation, *Bureau of Reclamation Asset Management Plan Fiscal Year 2009,* p. 3. Hereinafter referred to as "AMP."

[3] AMP, p. 40.

[4] One acre-foot is the amount of water required to cover an area of one acre to a depth of one foot—325,851 gallons.

Figure 1. Age of Reclamation Dams

(as of 2009)



Source: U.S. Dept. of the Interior, Bureau of Reclamation, *Bureau of Reclamation Asset Management Plan Fiscal Year 2009*.

Reclamation's unique ownership and contractual responsibilities impact its approach to infrastructure management. Approximately one-third of Reclamation's facilities are owned, operated, and maintained by Reclamation ("reserved works"), with project beneficiaries responsible for repaying the federal government for construction and maintenance costs. These projects are typically multipurpose facilities. In contrast, the remaining two-thirds of Reclamation's facilities are also owned by Reclamation (i.e., Reclamation has title to the facilities), but their operation and maintenance has been transferred to a nonfederal entity ("transferred works"). Transferred works are often "single purpose" projects that must pay maintenance costs in the same year in which they are incurred. Both classes of projects are known to sometimes have difficulty in financing major maintenance costs.

Previous legislation has attempted to address issues associated with Reclamation's aging infrastructure. The Rural Water Supply Act of 2006 (P.L. 109-451) established a loan guarantee program for Reclamation's reserved and transferred works.[5] The Omnibus Public Lands Management Act of 2009 (P.L. 111-11, Subtitle G) authorized actions to address Reclamation's aging infrastructure issues, including authorization of a program to conduct inspections at Reclamation-owned facilities in urban areas.[6] The same bill provided Reclamation with authority to advance funds for emergency extraordinary operation and maintenance work on both reserved and transferred infrastructure.[7]

This report discusses Reclamation's approach to managing aging infrastructure. It notes potential issues with this approach, as well as recent funding trends in this area. It also discusses alternative

[5] See section below on "Loan Programs and Extended Repayment Periods."

[6] P.L. 111-11, Section 9602.

[7] P.L. 111-11, Section 9603. Several notable components of earlier legislation from the 110th Congress (S. 2842) were omitted from P.L. 111-11, including a mandate that Reclamation conduct pilot projects for a loan guarantee program (see section below on "Loan Programs and Extended Repayment Periods") and a requirement for Reclamation to publish a national priorities list for infrastructure upgrade needs.

approaches that have recently been proposed or enacted to deal with the issue of Reclamation's aging infrastructure, and the status of these efforts. It concludes with a discussion of how Reclamation's approach compares to other water resource agencies, and analysis of issues for Congress.

Reclamation's Approach to Aging Infrastructure Management

General Approach

Maintenance, repair, and rehabilitation needs at Reclamation projects are typically identified through regular monitoring by project operators, or more formal facility condition assessments performed by technical experts. Maintenance activities are scheduled, funded, and accomplished based on an assessment of the work's necessity by multiple managers. Abrupt facility failures may receive immediate maintenance action to restore facility service or protect public safety.[8] Finally, if the facility has reached or exceeded its expected service life, Reclamation may consider a major rehabilitation or replacement activity (i.e., recapitalization effort).

The primary day-to-day responsibility for asset management lies with Reclamation's 25 area offices. Each office reports to one of the five Reclamation regional offices which, in turn, reports to the Deputy Commissioner for Operations. Ultimately, asset portfolio decisions are the responsibility of the Commissioner, who relies on several advisory bodies for assistance.

Reclamation's Facilities Operation and Maintenance (O&M) Team addresses Reclamation-wide O&M-related priorities, issues, activities, program and budget formulation, and facilitates program accomplishment. The team's responsibilities include reviewing and making recommendations to the Deputy Commissioner for Operations on issues including:

- deferred maintenance,
- asset management,
- condition assessments/field review activities,
- replacements, additions, and extraordinary maintenance (RAX) items,
- facility security and public safety, and
- maintenance management practices and systems.[9]

The identification of maintenance needs is similar for both reserved works and transferred works. Maintenance needs are identified either by the local operating entities (either Reclamation or nonfederal users) or through periodic facility reviews conducted by Reclamation. However, for transferred works, Reclamation notes that performance data is in some cases limited.[10] For instance, some transferred works are subject to O&M reviews, but do not have a documented performance rating that allows for project-to-project comparisons with reserved works.[11] This

[8] Reclamation has previously stated that its policy is that no "critical maintenance" will be deferred. See AMP, p. 31.

[9] AMP, p. 30.

[10] AMP, p. 40.

[11] AMP, p. 27.

may make it more difficult to compare and track these two classifications of facilities and to make related funding decisions.

Major maintenance or rehabilitation activities for Reclamation's projects are typically funded through a line item in the facilities maintenance portion of the budget known as RAX (replacements, additions, and extraordinary maintenance) or else through the Safety of Dams Program.[12] Some are directly funded by revenues from customers or other federal agencies (e.g., Bonneville Power Administration). Within the RAX program, funds are provided to each region on an annual basis. Non-reimbursable RAX expenditures typically make up 4%-7% of Reclamation's total appropriation.[13]

Notably, reviews by Reclamation and other entities have previously found that the bureau has difficulty budgeting for "non-routine" (i.e., major) items in its RAX program, and that there is room for improvement in the planning process.[14] For instance, previous findings by the National Research Council indicated that there was no common quantifiable approach to prioritizing RAX across Reclamation regions and that inputs related to the program's priorities were applied with varying consistency.[15] Reclamation also found that the RAX program could benefit from improved long-range planning, which would allow more lead time to prepare for large RAX expenditures.[16]

Reclamation notes that it is addressing concerns with its RAX program in a number of ways, including analyzing past RAX expenditures, developing a quantifiable prioritization framework for O&M needs across Reclamation, improving management practices, and developing a capital rehabilitation investment strategy for the next 10 to 20 years.[17] Since most of these efforts remain internal to Reclamation, the extent to which they have impacted project planning and budget requests is unclear.

Focus on Facility Types: Dam Safety Program

The Reclamation Safety of Dams Act of 1978 (P.L. 95-578, and amended in 1984 under P.L. 98-404) gave the Secretary of the Interior permanent authority to modify Reclamation dams and related facilities to ensure their structural integrity and safety. The act provides direction on how repair or upgrade work is to be classified for repayment. Generally, repair costs that are the result of modifications due to age, normal deterioration, or nonperformance of normal maintenance are considered reimbursable project costs, while those resulting from new safety criteria or new hydrologic or seismic data are nonreimbursable. Reclamation's Dam Safety Program has two primary components, the Safety of Dams Evaluation and Modification Program and the DOI Dam Safety Program. The DOI Dam Safety Program is a relatively small program—the FY2012

[12] The Safety of Dams (SOD) program focuses on evaluating and implementing actions to resolve safety concerns at Reclamation dams. See section below on "Focus on Facility Types: Dam Safety Program."

[13] The FY2012 Administration Request for RAX items is $40.1 million. Overall expenditures for Facilities Maintenance in the FY2012 Request are $98 million.

[14] See James K. Mitchell, Patrick R. Atkins, and Allan V. Burman, et al., *Managing Construction and Infrastructure in the 21st Century Bureau of Reclamation*, National Research Council of the National Academies, Washington, DC, 2006, http://books.nap.edu/catalog.php?record_id=11519.

[15] U.S. Department of the Interior, Bureau of Reclamation, *Managing for Excellence*, Report on Operation and Maintenance Planning and Budgeting, Tasks 29 and 30, Washington, DC, January 3, 2007, p. 2, http://www.usbr.gov/excellence/Finals/Team29_30FinalReport.pdf.

[16] *Managing for Excellence*, p. 5.

[17] Bureau of Reclamation, *Managing for Excellence*, Concluding Report, Washington, DC, October 2008, p. 11, http://www.usbr.gov/excellence/Finals/concludingreport.pdf.

budget request is $1.6 million—that provides facilitation and guidance to other DOI departments on their dam safety programs.

The Safety of Dams Evaluation and Modification Program constitutes the bulk of the dam safety budget, with an FY2012 budget request of $83.7 million. It focuses specifically on Reclamation dams and has two primary sub-tasks, the Safety Evaluation of Existing Dams program (SEED) and the Initiate Safety of Dams Corrective Action program (ISCA). The SEED program is focused on the analysis and identification of potential hazards or increased risk at Reclamation dams, while ISCA is the implementation component of the program aimed at the study, identification, and accomplishment of repairs or rehabilitation.

When a need for corrective action is identified, that action is funded under ISCA. Funding requests to begin and continue the construction of remedial actions identified through ISCA are transferred from the Dam Safety Program and assigned to the specific project.

Work funded through ISCA is conducted under authority granted by the Safety of Dams Act; however, the SEED program is a response to the October 4, 1979, presidential memorandum directing federal agencies to implement the *Federal Guidelines for Dam Safety*.[18] SEED work is considered a public benefit and its costs are not assigned to a specific project for reimbursement.[19]

Tracking Reclamation's Maintenance Backlogs

Reclamation tracks its infrastructure needs internally, but it typically has not provided project-level lists to the public. Within its asset management budget, Reclamation distinguishes between "deferred maintenance," or regular maintenance which was not performed when it should have been, and "indicated maintenance," or maintenance that is recognized as needing to be achieved but which may or may not be scheduled. While deferred maintenance is tracked and reported on annually in Reclamation's Asset Management Plan, indicated maintenance is the result of internal inspections occurring every three to six years and is not typically updated in any regular reporting mechanism.[20]

Reclamation's deferred maintenance needs have have gradually increased over time. Over the last 10 years, Reclamation reported that it spent approximately $40 million-$45 million annually on deferred maintenance for aging infrastructure, which was enough to offset most new deferred maintenance needs. Most of this funding was provided under Reclamation's Facility Maintenance and Rehabilitation budget line item.[21] In FY2008, documented deferred maintenance needs increased significantly, to approximately $82 million. (See **Figure 2**.) Reclamation reported that this was mostly due to updates of multiple outdated cost estimates that had been the basis for some previous deferred maintenance estimates.[22] It is unclear whether Reclamation will be able to continue to offset these increased expenditures under its current budget baseline, which has been essentially flat in recent years.

[18] U.S. Dept. Of Homeland Security, Federal Emergency Management Agency, *Federal Guidelines for Dam Safety*, June 1979, reprinted April 2004. Available at http://www.fema.gov/library/viewRecord.do?id=1578.

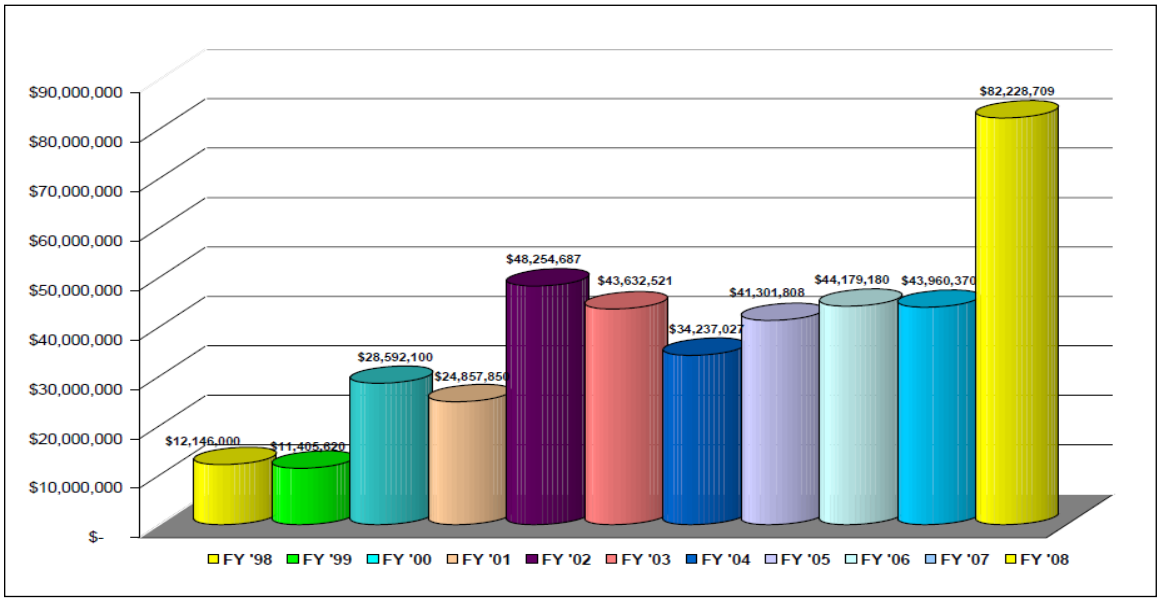
[19] Bureau of Reclamation FY2009 Budget Justification, *Bureauwide*, pp. 8, 9, and 11.

[20] Telephone conversation with Ella Mae Herrera, Manager of Maintenance Services, Bureau of Reclamation, February 24, 2011.

[21] AMP, p. 32.

[22] AMP, p. 31.

Figure 2. Bureau of Reclamation: Deferred Maintenance, FY1998-FY2008



Source: U.S. Dept. of the Interior, Bureau of Reclamation, *Bureau of Reclamation Asset Management Plan Fiscal Year 2009*.

Notes: Includes Reserved Works only. Since operations & maintenance of transferred works is a non-federal responsibility, it is not included in deferred maintenance calculations. Increase from FY2007 to FY2008 reflects updates from outdated cost estimates for deferred maintenance.

Reclamation's indicated maintenance needs are not tracked publicly and are not available at the project level. In the past, these needs have provided informally by Reclamation to Congress as an approximate estimate of maintenance needs on all of Reclamation's infrastructure. For instance, in a 2008 hearing, Reclamation estimated that throughout the West, maintenance needs on Reclamation facilities exceeded $3.2 billion.[23] At the same hearing, Reclamation noted that approximately $800 million of these needs were for transferred facilities and $600 million were for dams that would be funded under the Dam Safety Program.[24] The remaining $1.4 billion encompassed needs for hydropower assets (which would be funded from power revenues) and funding for other reserved works. Citing the confidential nature of this information, Reclamation previously has not produced additional details on these figures, including projections related to the timing and nature of specific funding requirements for major maintenance upgrades. Reclamation has also emphasized the insufficient nature of its current data to support long-term planning decisions.[25]

In the American Recovery and Reinvestment Act (ARRA, P.L. 111-5), Reclamation received approximately $950 million, of which a portion was to be allocated for infrastructure reliability and safety. In its final project selection list, Reclamation budgeted $165 million for projects in this category.[26] Of this funding, $91 million was for two large projects, and the remaining $74

[23] U.S. Congress, Senate Committee on Energy and Natural Resources, Subcommittee on Water and Power, *Statement of Robert W. Johnson*, Hearing on Reclamation's Aging Infrastructure, 110th Cong., 2nd sess., April 2008. (Hereafter referred to as "Johnson, Aging Infrastructure.")

[24] Johnson, Aging Infrastructure.

[25] Johnson, Aging Infrastructure.

[26] Additionally, under P.L. 111-5, Reclamation was provided with the authority to advance Recovery Act funds for extraordinary maintenance and rehabilitation. See below section, "Loan Programs and Extended Repayment Periods."

million went to smaller rehabilitation projects. Since Reclamation has yet to update its deferred and indicated maintenance totals to reflect spending under the Recovery Act, the effect of these investments on its maintenance backlogs is not currently available.

Other Approaches

Concerns with Reclamation's aging infrastructure have led to congressional efforts to address needs both at individual projects and at Reclamation's facilities in general. In some instances, the rehabilitation and maintenance of specific Reclamation projects has been addressed directly by legislation that alters the required cost shares and repayment periods for these facilities. Additionally, a number of other efforts that would provide additional options to address aging infrastructure have been recently proposed or enacted by Congress. This section provides a summary of these efforts.

Focus on Individual Projects

Arrowrock Dam

Arrowrock Dam is owned and operated by Reclamation. The 350-foot high concrete arch dam outside of Boise, ID, was completed in 1915. After nearly 90 years of continuous operations, Reclamation replaced all 10 of the lower valves with devices called clamshell gates that would permit inspection and maintenance without the need to draw down the level of the reservoir.[27]

In Section 206 of the Energy and Water Development Appropriations Act of 2002 (P.L. 107-66), Congress stipulated that Reclamation was to recover no more than $6.9 million (35%) of reimbursable expenses typically charged to water users for project O&M costs at Arrowrock Dam. Congress further stipulated that these costs were to be recovered over a 15-year period. Reclamation typically requires O&M costs to be repaid by project beneficiaries within the fiscal year that the funds were disbursed.[28]

Jackson Gulch Dam

The Mancos Project in southwestern Colorado includes the Jackson Gulch Dam and reservoir, as well as inlet and outlet canals. It provides supplemental irrigation water for nearly 14,000 acres. The project was approved by President Roosevelt on October 21, 1940.[29] Construction began in 1941, and was completed nine years later. The first water from Jackson Gulch Reservoir was delivered to water users in 1949. The project is a transferred work, and responsibility for O&M at the project was turned over to the Mancos Water Conservancy District in 1963.[30]

Despite initial opposition by the Bush Administration in prior Congresses, the Jackson Gulch Rehabilitation Act was authorized in the 111th Congress in the Omnibus Public Lands Act of 2009

[27] See http://web.archive.org/web/20030813035609/www.usbr.gov/pn/programs/arrowrockvalve/.

[28] Document provided on April 18, 2008, by Reclamation's Contracts Services Office, Denver, CO; and testimony of Mr. Charles McGinnis, National Research Council Committee, before the Senate Committee on Energy and Natural Resources, Subcommittee on Water and Power, April 17, 2008.

[29] Water Conservation and Utilization Program Act of August 11, 1939 (53 Stat. 1418), as amended October 14, 1940 (54 stat. 1119).

[30] Reclamation website for the Mancos Project at http://www.usbr.gov/dataweb/html/mancos.html.

(P.L. 111-11).[31] The act directs the Secretary of the Interior, through Reclamation, to pay 65% share of the cost of the Jackson Gulch Rehabilitation Project and authorizes $8.25 million for the federal share of rehabilitation work. Under the act, the Mancos Water Conservancy District is to remain responsible for O&M at the project. Prior to passage of the legislation, Reclamation argued that it considered rehabilitation for this and other transferred works to be O&M, and thus the responsibility of water users.[32]

In enacted appropriations for FY2010, the Jackson Gulch Rehabilitation project received an initial appropriation of $1.75 million.[33] The authorization and funding for this project may be significant because it provides federal funding for a maintenance issue at a transfer project that would otherwise be the responsibility of non-federal users. The project may bring up larger questions around the federal role in maintaining the nation's aging infrastructure versus adherence to contractual obligations and reliance on the ability of project stakeholders to perform significant work associated with rehabilitation.

St. Mary Dam and Diversion

The St. Mary Diversion Dam is part of Reclamation's Milk River Project in northwestern Montana and is owned and operated by Reclamation. The dam, located on the St. Mary River, is 6 feet high and diverts water to the St. Mary Canal. The canal runs 29 miles to the point where the water is discharged into the North Fork of the Milk River.[34] Features of the canal in need of repair are sections of the earthen canal itself; two large sets of pipes (one 3,600 feet long, another 1,405 feet long); and a series of five large concrete drops at the lower end of the canal. The canal's current capacity is 30% below the designed capacity, in part because of maintenance issues. In 2006, it was reported that the earthen canals are crumbling, the pipes that carry the water across the St. Mary River and Hall's Coulee are affected by slope instability and leakage, and the concrete drops at the end of the canal were cracking.[35]

The Water Resources Development Act of 2007 (P.L. 110-114, § 5103), authorized $153 million for the Secretary of the Army, in consultation with Reclamation, to study, plan, design, and construct the rehabilitation of the St. Mary Dam and Conveyance Works. This section also required that the federal share of the cost for this project be 75%. Except for construction associated with standard O&M and for emergency repairs that ensure water transportation or protect life or property, no construction was authorized to begin until January 2011.

Reclamation has requested funding for studies related to this rehabilitation project in recent budget requests, but the Corps has yet to fund this authorization.[36] Notably, Reclamation did not support authorization for construction in WRDA or the cost-sharing arrangement in the bill.

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[31] P.L. 111-11, § 9105.

[32] Hearing before the Subcommittee on Water and Power of the Senate Committee on Energy and Natural Resources, testimony of Mr. Larry Todd, Deputy Commissioner for Policy, Administration and Budget, Bureau of Reclamation, S. Hrg. 110-152, *Miscellaneous Water and Power Legislation*, July 26, 2007, p. 9.

[33] No funding was requested for this project in the President's Budget, but funding was provided by Congress. U.S. Congress, *Report 111-278, Conference Report to accompany P.L. 111-17*, 111th Cong., 1st sess., September 30, 2009, p. 277.

[34] See http://www.usbr.gov/dataweb/html/milkriver.html#general.

[35] Hearing before the Senate Committee on Energy and Natural Resources, statement of Senator Max Baucus, S. Hrg. 109-764, *St. Mary Diversion and Conveyance Works and Milk River Project*, September 1, 2006, p. 3; and Paul Azevedo, Montana Dept. of Natural Resources and Conservation, *The Need to Rehabilitate the St. Mary Facilities*, p. 1. See http://dnrc.mt.gov/st_mary/pdfs/stmarybackground.pdf.

[36] In FY2010 (P.L. 111-85), Congress appropriated $3.5 million for this project.

Reclamation indicated that authorization of construction prior to the completion of feasibility studies was premature, and that pending tribal water rights claims should be resolved prior to rehabilitation work at the project. Further, Reclamation opposed the proposed project repayment terms, citing a concern that repayment terms which depart from standard Reclamation practice are precedent-setting and may pose problems for the agency in the future.[37]

Loan Programs and Extended Repayment Periods

The one-time costs of extraordinary maintenance and rehabilitation efforts can be prohibitive for nonfederal entities that operate infrastructure owned by Reclamation (i.e., transferred works). As a result, securing loans or outside funding for these projects is often a priority for project operators. However, obtaining needed funding for rehabilitation can be difficult because the federal government retains title to these facilities, so the facilities themselves cannot be used by the operators as collateral to secure a private loan. Some have called for federal support of one or more credit (loan) programs to aid nonfederal entities in making repairs and/or upgrades to Reclamation infrastructure to resolve this issue.

Congress has previously authorized loan programs that aim to address the issue of repair and maintenance of Reclamation's transferred works. In 2006, the 109th Congress authorized a loan program for Reclamation under Title II of the Rural Water Supply Act of 2006 (P.L. 109-451). The program is to provide federal loan guarantees to project beneficiaries and make it easier to secure private funding.[38] However, this program has not yet received funding. The Bush and Obama Administrations have both been hesitant to support the loan program in practice because of executive branch interpretations of the required subsidy cost to administer the program under the Federal Credit Reform Act of 1990 (P.L. 101-508).[39] The executive branch has contended that the subsidy cost for federal loan guarantees under P.L. 109-541 must include an up-front appropriation equal to the full amount of the loan. User interests disagree with this interpretation and argue that the subsidy cost should be a percentage of guaranteed loans that may default, which would be a fraction of the cost of the loan itself.[40] As a result of this disagreement, to date, no projects have been funded under this program.

Other laws have recently authorized Reclamation and its users with authorities to address aging water infrastructure. The Omnibus Lands Act of 2009 (P.L. 111-11) authorized the Secretary of the Interior to advance funding for emergency extraordinary operation and maintenance work on both transferred and reserved works. Similarly, the American Recovery and Reinvestment Act of 2009 (P.L. 111-5, ARRA) provided authority for Reclamation to advance funds available through the Recovery Act and to extend the repayment period for such costs up to 50 years. Reclamation reports that while some users have expressed an interest in these provisions, to date no users have entered into a formal agreement under these provisions.

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[37] Hearing before the Senate Committee on Energy and Natural Resources, statement of Mr. Mike Ryan, Regional Director, Bureau of Reclamation, S. Hrg. 109-764, *St. Mary Diversion and Conveyance Works and Milk River Project*, September 1, 2006, pp. 40-42.

[38] A federal loan guarantee is a promise that a loan will be backed by the full faith and credit of the United States. That is, in the case of default, the U.S. government is responsible for repaying remaining balance of the loan.

[39] Under this law, funds must be appropriated to cover the subsidy cost of loan guarantees, measured on a present value basis.

[40] A previous CBO estimate for P.L. 109-541 estimated a subsidy rate of 2%, or approximately $1 million per year over 2006-2010.

Proposals to Utilize Reclamation Fund Balances

Separately, some have also called for utilizing balances in the Reclamation Fund to provide dedicated funding for infrastructure needs. [41] Funding from the Reclamation Fund is appropriated annually by Congress to certain projects operated by the Bureau of Reclamation and the Western Area Power Administration. Appropriations from the Reclamation Fund provide for construction and maintenance of reserved works and make up a large percentage of Reclamation's annual enacted appropriations.[42] As a result of increasing receipts going into the fund (mostly from onshore mineral leasing), the balance of the Reclamation Fund has increased significantly and may soon exceed $9 billion.[43] Users contend that without further action from Congress, these balances will continue to grow.

Hypothetically, Congress could act to dedicate balances from the Reclamation Fund to Reclamation projects in any number of forms, including both direct funding for major repair and maintenance activities over one or more years, or funding to finance direct loans or loan guarantees (see above). Users note that the Reclamation Fund was intended to benefit western states, and making it available for major maintenance projects is a logical use of the fund. However, others note that since the Reclamation Fund is subject to appropriations by Congress, it is also subject to congressional scoring requirements, including annual appropriations caps and statutory PAYGO rules.[44] These requirements would likely complicate efforts to dedicate these revenues to a specific purpose.

Corps and NRCS Approaches to Aging Infrastructure Management

Two other federal agencies associated with significant inventories of dams and other water resources infrastructure are the U.S. Army Corps of Engineers and the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS). They have different roles and responsibilities regarding O&M and rehabilitation. The Corps is an active federal dam operator, while NRCS was a partner in the construction of many agricultural dams that are the responsibility of local entities, and is now a partner in their rehabilitation. The O&M prioritization programs for the Corps and NRCS are summarized below.

The Corps of Engineers

The Corps is responsible for water resource projects that provide flood damage reduction, navigation, hydropower generation, and water supplies.[45] The agency operates and maintains 650

[41] The Reclamation Fund is a special fund within the General Fund of the U.S. Treasury. It was established in the Reclamation Act of 1902 (43 U.S.C. § 391). The fund was designated to be used in the examination and survey for and construction and maintenance of irrigation works for the storage, diversion, and development of waters in the western United States. It is derived from repayments and other revenues from certain Reclamation projects, as well as certain receipts from sales, leases, and rentals of federal lands in the 17 western states (including mineral leases).

[42] For instance, in FY2010 $850 million of the enacted appropriation of $951 million was to be financed by the Reclamation Fund.

[43] *The Appendix, Budget of the United States Government, Fiscal Year 2011*, Department of the Interior, February 2010, p. 669.

[44] For more information on statutory PAYGO requirements, see CRS Report R41157, *The Statutory Pay-As-You-Go Act of 2010: Summary and Legislative History*, by Bill Heniff Jr.

[45] See http://www.usace.army.mil/missions/#Water%20Resources.

dams, including 75 hydroelectric power stations that generate 24% of the nation's hydropower and 3% of its total electricity. It also operates and maintains 238 navigation locks, 138 of which are more than 50 years old. Overall, it is responsible for the fourth-largest asset portfolio among federal agencies. The estimated value of this infrastructure is $232 billion. The backlog for deferred maintenance on Corps projects has increased over the last 10 years, and was most recently estimated to exceed $2.6 billion. Notably, the Corps has not provided a publicly available figure that corresponds to Reclamation's "indicated maintenance" backlog.

In contrast to Reclamation, the Corps does not distinguish between ongoing project operations and major repairs or extraordinary maintenance for these projects. All of these activities are included within one budget line, the operations and maintenance (O&M) line. For each budget cycle, the Corps publishes its procedures for ranking O&M actions for the portfolio of its infrastructure. Similar to Reclamation, the budget process starts at the Corps district and division level, where individual budget activities within business lines are identified.[46] Business lines are functional categories such as hydropower, navigation, and water supply. Each activity is ranked based on the O&M procedures for its business line for that budget cycle, and the cost of each activity is estimated. The rankings are largely determined by project performance measures; most of these measures are based on economic (e.g., tons of commercial cargo moved, benefit-cost ratio), safety, or environmental outputs. Despite having organized some O&M requests by geographic regions or basins during the last Administration, recent budgets have returned to the practice of providing O&M totals for individual projects. As indicated by the Corps' budget development procedures, the process for developing the basin or region O&M estimates consists of aggregating estimates for individual actions.

The actions included in the Administration's final budget request are determined by Corps headquarters in conjunction with the Office of Management and Budget. Based on the rankings supplied from the Corps Divisions, Corps headquarters works with the Administration to determine policy priorities that adhere to the procedures established for that budget cycle.[47] Although the Administration identifies and prioritizes project O&M funding needs based on Corps procedures and Administration policy, Congress also directs Corps funding for specific projects during its annual consideration of Energy and Water Development appropriations bills.

The Corps is similar to Reclamation in that major repair and replacement efforts are largely determined by internal criteria and congressional direction, and the process for selecting these projects has been criticized by some observers. Also similar to Reclamation, interest groups have in the past complained that Corps infrastructure is deteriorating and underfunded. The Corps is currently undergoing changes to modernize its asset management procedures. Among these are efforts to better evaluate and quantify deferred maintenance both at individual facilities and across Corps divisions, as well as efforts to examine cost and condition variances among similar asset types.

Unlike Reclamation, the Corps is responsible for O&M at the majority of its projects. A notable exception is levees, which are often built by the Corps but maintained by local interests (however, in contrast to Reclamation, the Corps generally does not maintain title to these facilities). Deterioration and upkeep of federally built and locally operated levees is a current issue of

[46] Within the Corps there are eight divisions, or Major Subordinate Commands (MSC), across the United States. In turn, these are composed of 41 districts. Division and district boundaries are defined by watershed, not states.

[47] Dept. of Defense, U.S. Army Corps of Engineers, *Army Programs—Corps of Engineers Civil Works Direct Program—Program Development Guidance Fiscal Year 2009*, pp. C-2-13 and C-2-14.

concern for Congress, and shares issues in common with those faced by Reclamation, especially those pertaining to transferred works.[48]

Natural Resources Conservation Service[49]

The NRCS has participated in the construction of over 11,300 dams under the authority of the Watershed Protection and Flood Prevention Act (P.L. 83-566).[50] Local sponsors own the dams and are responsible for their operation and maintenance. In 2000, the Watershed Protection and Flood Prevention Act was amended to authorize NRCS to assist with rehabilitation of these aging dams under a Watershed Rehabilitation Program.[51] The NRCS approach to aging infrastructure is driven by the end user, with assistance from the Watershed Rehabilitation Program allocated based on the risk to public safety and availability of appropriations. Only dam structures built with NRCS assistance are eligible for rehabilitation assistance under this program.[52]

NRCS staff do not make estimates of future rehabilitation funding needs. Rehabilitation projects are identified by local entities, and they can apply for rehabilitation funding assistance. Local sponsors can apply for the Watershed Rehabilitation Program at any time as long as they are within the eligibility criteria for the program. When NRCS receives an application, NRCS's state conservationists perform a risk assessment of the hazards associated with the dam. The state conservationists forward assistance requests along with data from the risk assessment to NRCS headquarters annually. In FY2010, NRCS conducted 650 ongoing assessments of high-hazard dams as classified in the national dam safety classification system. The national office evaluates all requests and funds those that pose the highest risk to public safety within available appropriations. NRCS may provide 65% of the total rehabilitation costs but no more than 100% of the actual construction cost, and is prohibited from funding operation and maintenance expenses. As of the end of FY2010, 228 rehabilitation projects had been funded, and 95 dams in 14 states had been completely rehabilitated. In addition, project sponsors requested a total of $37.5 million to restore 90 high priority dams in 24 states in FY2010. The number of projects funded by NRCS is typically less than the total applications for aid, and total applications for aid do not necessarily reflect the total need.[53] In recent years, appropriated funding for this program has ranged from $20 million-$40 million. The Administration's FY2012 budget request proposes to zero out funding for this program.[54]

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[48] For more information, see CRS Report RL33129, *Flood Risk Management and Levees: A Federal Primer*, by Betsy A. Cody and Nicole T. Carter.

[49] By Megan Stubbs, Analyst in Agricultural Conservation and Natural Resources Policy.

[50] For additional information, see CRS Report RL30478, *Federally Supported Water Supply and Wastewater Treatment Programs*, coordinated by Claudia Copeland.

[51] 16 U.S.C. § 1012.

[52] NRCS assistance may have been provided through the following programs: Watershed Protection and Flood Prevention Act of 1954 and Flood Control Act of 1944 (collectively referred to as the Small Watershed Program), Pilot Watershed Projects authorized by the Agriculture Appropriation Act of 1953, or the Resource Conservation and Development Program. In addition to privately owned dams constructed with the assistance of NRCS, other classes of private dams are also subject to federal oversight and inspections. These include private hydropower dams (overseen by the Federal Energy Regulatory Commission) and certain mining dams (overseen by the Department of Labor's Mine Safety and Health Administration).

[53] In some cases, the need for aid may be present, but NRCS may not act until a request is made by the local project sponsor. In other cases, a request for aid may be made, but the dam is not classified as a high-hazard dam and therefore is not considered a priority for funding.

[54] This request is not indicative of reduced need for assistance but rather of what the FY2012 budget request states as one of "many difficult choices ... made in the fiscal year 2012 budget proposal in order to ensure fiscal responsibility

Summary and Analysis

There is a process within Reclamation for identifying and prioritizing rehabilitation funding needs of the water resources infrastructure that the agency has constructed since it was created in 1902. However, as a result of increasing needs, constrained budgets, and the unique nature of the ownership arrangements for Reclamation projects, many view the current process as inadequate. Outside of the Dam Safety Program, aging infrastructure that is owned and maintained by Reclamation (i.e., reserved works) is generally selected for expenditure either by internal criteria determined on the regional level, or else through directed spending by Congress that provides support to individual projects. For infrastructure that is owned by the federal government but maintained by nonfederal interests (i.e., transferred works), there is no formal process to identify and assist in paying for major upgrades. Other agencies, including the Corps (with regard to levees) and the NRCS (with regard to small dams) face similar problems with the upkeep of infrastructure that was built by the federal government but is now maintained by nonfederal interests.

As Reclamation's maintenance needs increase, the prioritization process for aging infrastructure may receive increasing attention. An overarching question for Congress is whether the efforts of Reclamation and other agencies to identify and prioritize aging infrastructure are adequate. As previously noted, current practices within the Corps, Reclamation, and NRCS have generally provided limited funding for aging water resource projects that are owned and operated by the federal government, and have provided limited or no funding for upgrades to projects that are operated by nonfederal partners.

Due to potential needs for costly repairs and upgrades on Reclamation facilities, the question of who should pay and how much, at both transferred and reserved works, will likely be raised repeatedly in the coming years. The question may be of particular concern for rehabilitation projects at transferred facilities, which the Administration has generally refused to support in the past, and which have on occasion experienced major failures and subsequently received attention from Congress.[55]

Some claim that it is in the nation's best interests for the federal government to provide increased support for all facilities that are federally owned (regardless of the operator) because there are major societal costs to allowing these facilities to deteriorate. Additionally, these interests argue that the difficulty that private entities have financing these upgrades necessitates aid by the federal government. On the other side of this issue, some (including the current Administration) note that allowing nonfederal entities to renege on their contractual responsibilities sets a troubling precedent, and that a major influx of federal funding is not practical in light of constrained budgets. Additionally, due to the inherently decentralized and at times sporadic documentation of needs to date, the actual extent of current needs is not well defined. Although numerous entities supported recently passed provisions that extended the repayment period for extraordinary maintenance expenses at both reserved and transferred works, to date few

within the current economic climate." 2012 USDA Budget Explanatory Notes for Committee on Appropriations, *Watershed Rehabilitation Program: Justification of Increases and Decreases*, Natural Resources Conservation Service, 2011, pp. 24-42.

[55] For instance, the March 2008 failure of the Truckee Canal precipitated a congressional hearing. See U.S. Congress, Senate Committee on Energy and Natural Resources, Subcommittee on Water and Power, *Hearing on the Increasing Number of Issues Associated with Aging Water Resource Infrastructure That Is Operated and Maintained, or Owned, by the United States Bureau of Reclamation*, 110th Cong., 2nd sess., April 17, 2008, S.Hrg. 110-488.

beneficiaries have taken advantage of these terms. This may call into question the urgency of some calls for aid from the federal government.

Congress has recently enacted programs and funding for individual projects that fall outside of Reclamation's regular budget process for extraordinary maintenance needs at reserved facilities. For instance, it capped the total amount of O&M responsibility to be borne by water users at one reserved facility (Arrowrock Dam). In another case, the St. Mary Rehabilitation Project, Congress chose to authorize funding (and a 75% federal cost share) for another federal agency (in this case, the Corps) to do the work instead of Reclamation. Funding for this project has yet to be initiated, and may conflict with existing statutory requirements in § 4(a) of the Reclamation Safety of Dams Act of 1978.[56]

Rehabilitation of Jackson Gulch dam is an example of federal authorization and funding for a recapitalization effort at a transferred work. Although the Administration has refused to fund this project in its budget requests, Congress provided initial funding for the project in FY2010 enacted appropriations. While many argue that direct involvement by Congress is an acceptable way to designate high-priority projects and circumvent the executive branch prohibition on funding for transferred works, recent conference rules concerning earmarks could be problematic for this strategy. With or without a ban on these spending items, questions remain regarding whether an ad-hoc process in which funds are obtained for projects individually will be sustainable as needs for upgrades proliferate.

Other means for funding aging infrastructure, including loan programs and dedicated funding from the Reclamation Fund for aging infrastructure, are often raised as potential solutions, but have encountered setbacks within the executive branch and the appropriations process that have hindered implementation or enactment. In the future, Congress may be called upon to reconsider these and other proposals which attempt to address the issue of Reclamation's aging infrastructure.

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[56] P.L. 95-578. This act mandates that costs associated with modification of structures resulting from age and deterioration or nonperformance of normal maintenance by the operating entity are to be considered reimbursable project costs.

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